AVIATION SIMULATION TECHNOLOGY INC.

NEWSLETTER

SPRING 1982 PUBLISHED QUARTERLY VOLUME 3, No. 1

*****KEEPING YOU APPRISED OF OUR DEVELOPMENTS AND THOSE WITHIN THE INDUSTRY*****

"1981 WAS A YEAR OF CONTINUED GROWTH AND DEVELOPMENT FOR AVIATION SIMULATION TECHNOLOGY," writes President Webb Castor in the company's Annual Report. The company experienced revenue that was 190% of 1980, significantly expanded its sales coverages, and broadened its customer base with orders from ERAU, the FAA Technical Center, the Canadian Ministry of Transportation, FlightSafety International, and many others.

Investments and paybacks in new products continued in 1981 with production and delivery of the Horizontal Situation Indicator (HSI), additional flight and panel characteristics for light, twin-engined training aircraft, and ongoing high demand for the unique computer-generated visual display introduced in 1980. Development funding was expanded to include advanced training products such as a computer interface that will combine the techniques of simulation with those of interactive computer-assisted instruction. This "learning machine" will increase instructor productivity, improve the standardization and evaluation of flight training, and optimize training time by adapting to the learning rate of individual pilots.

While General Aviation has been AST's dominant marketplace to date, the company intends to expand its domestic and international marketplace, its product offerings, and its business. "Our objective in all of these areas," assures Webb, "will be to introduce and deliver high quality, high reliability, products that continue to provide effective vehicles for meeting our customers' objectives.

"We see 1982 as another growth year in spite of some of the economic and industry adversities. We see the future as one of dramatic opportunity and growth potential for the business of flight training systems and we are resolved to achieve a significant role in this future."

FLIGHTSAFETY INTERNATIONAL HAS ORDERED FOUR Aviation Simulation Technology flight simulators for the FlightSafety Academy in Vero Beach, Florida. AST President Webb Castor said, "Not only are we pleased by the magnitude of the purchase, but we are flattered at being selected by FlightSafety, themselves a sophisticated simulator manufacturer." The FlightSafety Academy offers all levels of fixed and rotary wing pilot training, including Private, Commercial, Instrument, Multiengine, Airline Transport Pilot, and Flight Instructor ratings. Airlines from around the world send classes of future captains to start their pilot training at the Vero Beach facility.

Albert Ueltschi, president of FlightSafety International and James Ueltschi, manager of the Vero Beach facility, required a thorough evaluation of the flight characteristics, navigation capability, and reliability of several simulators before selecting the Aviation Simulation units for their adaptability, which allows matching of training aircraft flight characteristics to the simulator. All units are being modified to accept 4" Sperry attitude indicators, displaying the more accurate and expanded pitch information emphasized in their training methods. Navigation PROM's will provide real world airports and navaids, with morse code identifiers, covering FlightSafety's Florida training areas. FlightSafety anticipates higher utilization rates, significantly lower maintenance costs, and greater training effectiveness with the new simulators.

PART-61 CHANGES WILL PERMIT GREATER SIMULATOR UTILIZATION. The NPRM for changes to Part-61's certification requirements for private pilots is expected to be published on April 1. Allowing 90 days for comments, the changes could become law as early as July 1. As we understand it, these changes are only the beginning. They reflect the Administrator's desire for "regulation by objective," and will be followed by changes in the commercial certificate and the instrument rating.

The initial changes will result in a new sport or recreational certificate, which will permit local flight under VFR conditions without the same cross-country and instrument requirements, and controlled field operation, as currently required for the Private certificate.

The major change, however, will apply to the Private certificate itself. Rather than requiring training for a given number of hours, the new regulation defines the experience requirements in terms of performance, taking into account the variances of student aptitude, training methods, and instructors. For example, instead of having to train for a specified number of hours in "maneuvering by reference to instruments," the applicant must merely demonstrate a defined level of proficiency. Cross-country requirements will similarly be defined in terms of the number of flights that must be completed, rather than the number of hours that must be endured. The 40-hour total time requirement will also be eliminated, allowing an applicant to apply whenever the instructor certifies that he can meet the performance requirements for each of the tested maneuvers. Part-141, with lower time requirements, will become meaningless and is expected to be eliminated.

We believe these changes will provide simulator operators with the competitive edge over the "all airplane" school. The FAA does not expect the changes in the regulation to affect the average experience level, which is currently 63 to 67 hours for Part-141 and Part-61 applicants, respectively. However, the use of a simulator to introduce and practice maneuvers should dramatically affect the number of airplane hours involved.

Embry-Riddle Aeronautical University at Daytona Beach has had an "hours waiver" for years, and has developed a program that introduces students (primary, instrument, and multiengine transition) to most maneuvers in the simulator before the aircraft. The University has consistently had applicants tested with fewer than the required number of hours of aircraft experience, and a lower combination of aircraft and simulator hours than the national average. In fact, its goal is to eventually do 70% of the training in the simulator and 30% in the aircraft.

We feel that those of you who are prepared to jump at this opportunity will gain a significant edge over your competitors using all aircraft training. You'll also have an edge over the school using a different simulator because the AST machines are unmatched in both aerodynamic and navigational capabilities. They also are the only machines with a visual display to allow the introduction of visual reference maneuvers, IFR transitions, etc.

SIMULATOR EVALUATION GUIDE AVAILABLE. In the last issue of the Newsletter, the "Instructor's Seat" described some of the manuevers we had used in evaluating simulators, and suggested that they might be valuable as training maneuvers. We now have a Simulator Evaluation Guide, which provides a checklist of evaluation criteria using a standardized format of these and other maneuvers. It also offers students and instructors a valuable series of manuevers that will help them to gain a better understanding of an aircraft's (and simulator's) performance.

The Guide's maneuver-oriented evaluation helps in assessing the simulator's value in a basic, advanced or instrument training curriculum or transition course.

Although we are using it as a sales tool, the Guide also can be used to reinforce the value of your AST simulator as a maneuver-oriented system, to justify increased use of the simulator for additional maneuvers, to allow comparison with a competitor's simulator, or, as noted, to train others.

Let us know if you would like a free copy. Multiple copies, minimum 25, can be purchased for $1 each. Please send your check with your order.

THE INSTRUCTOR'S SEAT: ADF BY THE NUMBERS. One of the outstanding advantages of a simulator is its ability to be positioned when you're establishing a navigational problem. It may be released, frozen, or repositioned as necessary to repeat or stop the problem until learning has occurred. Probably the best example of this is in teaching ADF orientation, intercepting, and tracking. And one of the best ways to demonstrate the benefits of simulator training to a prospective customer is to teach a technique such as ADF, which most pilots fear, in a very short period of time. Here, then, is a technique to do just that —ADF by the numbers.

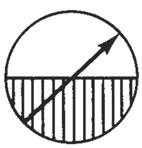
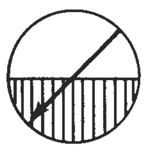
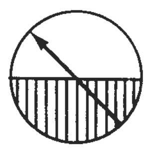
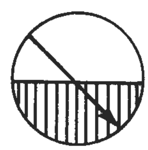
First, let me give you the method to show how simple it is to intercept any ADF bearing (or course):

1. Turn to parallel the desired course.
2. Turn toward this head of the needle by
   (a) Double the deflection angle (90° max) if inbound, or
   (b) 30° if outbound.
3. Intercept is complete when the deflection angle equals the amount turned (in Step 2 above).

The explanation of why this works follows:

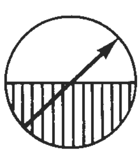
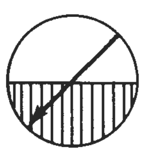
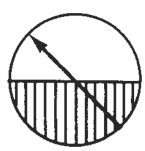
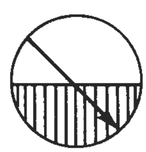
ORIENTATION: To find where we are relative to the station — to come up with a meaningful number — we want only a "bearing to" or "bearing from" the station. Those are the terms that ATC uses, and they have a dual meaning to the pilot. They tell us which "radial" we are on and, unlike VOR, the number will correspond to the direction in which we are proceeding: no problems such as "Proceed inbound on the 237 radial." In ADF, it would be: "Proceed inbound on the 057 bearing to the station." Our heading should be approximately 057, not its reciprocal.

To get this bearing, we simply look at the heading indicator (DG) and the top half of the ADF display. Using the zero as the index, read only that part of the needle that is up, be it the head or the tail. Furthermore, read only small numbers with 90° as a maximum; anything to the right of zero (001° through 090°) is read as a plus, while anything to the left of zero (270° through 359°) is read as a minus value. Call this number a "deflection angle" (DA). Thus:

 and  are both +45° DA and  and  are both −45° DA

Now, algebraically add this deflection angle to the heading. If we used the head of the needle to read our deflection angle, the number represents a bearing to the station. Conversely, if we used the tail of the needle for the DA, the number is a bearing from. Thus: THE HEAD OF THE NEEDLE (UP OR DOWN) HAS BECOME THE TO-FROM INDICATOR.

Using our four examples above with a heading of 100°, we would have:

 145° Bearing-to  145° Bearing-from  055° Bearing-to  055° Bearing-from

INTERCEPTING: To intercept a given bearing, either to or from the station, first turn the aircraft to a heading corresponding to that bearing. I know it sounds like an unnecessary step, and there are times when we will be able to skip it entirely, but remember — This always works! This turn can be likened to rotating the OBS knob on the VOR display to set the desired course. Turn to a heading parallel the desired course, then look at the head of the ADF needle. The head tells you which way to turn, left or right. Thus: THE HEAD OF THE NEEDLE (LEFT OR RIGHT) HAS BECOME THE COURSE DEVIATION INDICATOR (CDI) NEEDLE.

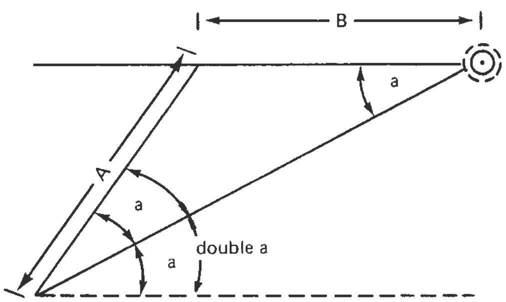
If the head is right, turn right to intercept; if the head is left, turn left. It doesn't matter whether the head is up or down, the direction of the turn will always be toward the head.

Now the obvious question is how much to turn. Since we have two situations, one inbound (the head is up) and the other outbound (the tail is up), we will use two different methods:

INBOUND (HEAD UP) — Turn double the deflection angle, toward the head of the needle. If the DA is 15°, turn 30°. If the DA is 45°, turn 90°. If the DA is more than 45°, turn 90° as a maximum. (A turn of more than 90° will take us away from the station.)

Other methods will also work here — in most cases. A 30° turn or a 45° turn will also take us toward the desired bearing, no matter what the DA. However, they will not guarantee that we will reach the radial before crossing the station. Especially when close to the station, we may find ourselves intercepting the proper bearing — but outbound — when we were attempting to use that bearing to track to the station.

There is an added benefit to the "double the angle" method. The geometry of the intercept is such that our no-wind track forms an isosceles triangle:



In this situation, leg A = leg B. Thus, with no wind, the time it takes from turning to intercept until intercepting desired course will equal the time remaining to reach the station.

As we make this turn, the ADF needle action will always be in the opposite rotational sense. If we turn clockwise, the needle will turn counterclockwise. Furthermore, since we are dealing with the upper half of the needle in this inbound case (the head is up), the left/right sense will also be opposite. If we turn right, the head of the needle will move left.

Thus, the turn towards the head will put the needle in position for its natural action to get us back on course. This natural action can be likened to the physical nature of the needle: the head, being larger and heavier, will fall. THE HEAD OF THE NEEDLE IS WEIGHTED AND WILL ALWAYS FALL (IN A NO-WIND CONDITION).

Since the head of the needle will try to fall every time we displace it either side of center (zero), our turn has put it in position to fall toward the course and DA we want.

OUTBOUND (TAIL UP) — Turn 30° toward the head of the needle. Since we're already past the station, we don't have to be concerned with intercepting in any given time or distance. A 30° cut will usually provide a reasonable closure rate and a smooth intercept.

As we make this turn, the same rotational rule applies. The needle will turn in the opposite rotational sense. However, since the head of the needle is in the bottom of the indicator in the outbound case, it will move in the same left/right sense as the turn. Rather than placing it on the opposite side of the indicator, we are merely moving it higher.

Again, the turn has placed the needle in position for its natural action (the head falling) to take it toward the desired course.

ON COURSE: In both cases, inbound and outbound, we are on course when the deflection angle equals the amount we turned. If we turned 60° to intercept inbound, a 60° DA will indicate an on-course condition. Similarly, since we turned 30° to intercept outbound, a 30° DA will indicate on-course.

Since the deflection angle is read in the top half of the indicator, we can see that the DA will be constantly increasing during an inbound intercept (since the head of the needle forms the DA), and it will be constantly decreasing during an outbound intercept (the tail forms the DA; the head is down and falling). Thus, too great a deflection angle inbound, or too small a deflection angle outbound tells us that we have overshot!

To summarize the concepts:

- The head of the needle (up or down) is the TO-FROM indicator.
- The head of the needle (left or right) is the CDI.
- The head of the needle is weighted and will always fall when displaced either side of center (in a no-wind situation).

To review the rules by the numbers:

1. Turn to parallel desired course.
2. Turn toward head of the needle by:
   (a) double the DA (90° max) inbound,
   (b) 30° outbound.
3. Intercept is complete when DA equals amount turned.

The demonstration, then, should go as follows, also by the numbers:

1. Tell the client you will teach him ADF intercepting, and have him instructing you as you fly a series of intercepts; all in only 15 minutes. Embellish this statement as much as you can.
2. Have him spend the first 5 minutes reading the previous section of this article; then have him write down the steps.
3. You fly the simulator and have the client talk you through a series of intercepts from various positions, which you have preplanned to save time. Have him keep his handwritten notes of the three steps in hand during the demonstration.
4. Show him a plot of the procedure, which you have thoughtfully preset in the plotter.
5. Sign him up for simulator (and aircraft) training.

—Ed Keins

(NOTE: This column is open to all. If you have a method you'd like to share with others, write it up or tell us about it. We will print with credit to the originator.)

EMPLOYEE UPDATE: Gaetan Chaput has assumed the position of Canadian Sales Manager for the company. He will be responsible for all sales and customer service activity throughout Canada. A former RCAF officer, Gaetan graduated from Laval University, and has held positions as project manager for Atkins & Merrill Training Equipment Division (simulators) and, most recently, as manufacturing manager for AST.

KEYS TO INCREASING SIMULATOR USE. We have been installing simulators for over two years now, and have developed a fairly large data base from which to draw utilization information. While the results are encouraging, they're hardly surprising. A number of units have in excess of 3,000 hours of Hobbs (and revenue) time on them, and one unit, installed in late March 1980, leads the fleet with over 4,200 hours. For those who are not in this elite group of high utilization operators, perhaps a quick profile of their successful operations would be valuable.

We've identified four key factors that seem to be present in most, if not all, successful operations — a large potential or existing customer base; management support, involvement, and encouragement; a prime mover; and a formalized simulator training curriculum.

You may have little control over the size of your potential market, but the successful operator goes out and actively recruits customers. He uses promotional mailings, special offers, and many other innovative techniques. The best way to improve your batting average is to increase the number of trips you take to the plate.

Management support goes beyond the initial purchase. Support means assigning someone to the project, ensuring that courses get written, demanding instructor participation, and rewarding exceptional performance. It means knowing how the simulator is doing, and why. In short, it means staying in control of the situation. Any manager aware of the potential profit margins on a simulator will demand exceptional performance.

The prime mover is the one who makes the strategy work. It is the instructor or the pilot who does the training, demonstrates the machine to prospective clients, and inspires others with his enthusiasm. You can't teach enthusiasm, but you should certainly encourage and support it when you find it in someone.

Any time spent in formalizing your simulator training curriculum is time well spent. Each simulator lesson, professionally organized and with a measurable result, should encourage what we're all looking for — increased usage. And there's nothing better for your own promotional efforts than a pleased instructor and a satisfied customer.

AVIATION SIMULATION TECHNOLOGY INC.
HANSCOM FIELD—EAST
BEDFORD, MASSACHUSETTS 01730